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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,908	02/08/2002	David William Kinnard	00-SM5-0142 (ATI-0009)	2272

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EXAMINER

ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 08/25/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/071,908

Applicant(s)

KINNARD ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 22-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 32-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I in Paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-3, 6, 7, 10-14, 16, 18, 19, 21, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) in view of Watanabe et al (USPat. 5,370,738). Hoke teaches a reactor assembly (Figure 3; column 7, lines 30-65) comprising:

- i. A base unit (20);
- ii. A optionally stationary chuck assembly (30,23) disposed in a cavity (30a,20a) of the base unit, wherein the chuck assembly comprises a support (23) having a surface capable of receiving a substrate (63);
- iii. A quartz (applicant's specification [0042]; column 7, lines 30-35) process chamber (11), transparent to UV and IR light sources, comprising a top wall (25), a bottom wall (opposite 25), and sidewalls (not labeled; perpendicular to 25) extending therefrom, wherein the process chamber is coupled to the base unit;
- iv. An inlet manifold assembly (15) in fluid communication with a first opening baffle plate / flow restrictor (12) of the process chamber in a selected one of the sidewalls (12), wherein

the inlet manifold assembly comprises a flow-shaping portion (15a) adapted to laterally elongate a gas and/or reactant flow in the process chamber; and

- v. An exhaust manifold assembly (16, 16b, 17) in fluid communication with a second opening (16b) of the process chamber in the sidewall diametrically opposed from the selected one (12) of the sidewalls, the exhaust manifold assembly is adapted to receive the gas and/or reactant flow from the process chamber at about a plane parallel to the surface of the substrate
 - a. The exhaust manifold assembly further comprises an exhaust receiving portion (16, 13) and a rectangular flow restrictor plate (“rectangular aperture”; not labeled; column 10, lines 4-9) having one passageway (16b), wherein the flow restrictor is affixed to an opening of the exhaust receiving portion and is adapted to restrict the gas and/or reactant flow through the opening from the process chamber into the exhaust receiving portion
- vi. The triangular flow-shaping portion (15a; Figure 3) of the inlet manifold assembly is adapted to introduce the gas and/or reactant flow into the process chamber at about a plane parallel to a surface of the substrate (column 10, lines 4-21); the flow-shaping portion adapted to laterally elongate a gas and/or a reactant flow into the process chamber – diffuser portion 15a
- vii. A light source assembly (IR light source radiation, 31; column 9, lines 36-60) in operable communication with the transparent top wall for projecting radiation into the process chamber

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Hoke does not teach a cylindrical opening extending through the bottom wall to the top wall to define a substantially cylindrically shaped interior region.

Watanabe teaches a similar horizontal-type MOCVD cylindrical reactor vessel (2, Figures 1-3; column 3, lines 29-50;). As such Watanabe teaches a cylindrical opening (volume created by 2) extending through the bottom wall (lower portion of 2; Figure 3) to the top wall (upper portion of 2; Figure 3) to define a substantially cylindrically shaped interior region.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Hoke's square reactor with Watanabe's cylindrical reactor.

Motivation to replace Hoke's square reactor with Watanabe's cylindrical reactor is to generate a laminar flow of reactant gasses as taught by Watanabe (column 2, lines 14-18; Figure 4; column 5, lines 35-45).

4. Claims 4 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) and Watanabe et al (USPat. 5,370,738) in view of Raaijmakers (USPat. 6,383,330 B1). Hoke and Watanabe are discussed above. Hoke and Watanabe do not teach that his top wall of the process chamber is removable. Raaijmakers teaches a similar horizontal flow deposition chamber (Figure 6; column 11, lines 16-67). Specifically, Raaijmakers teaches that his top wall (112) of the process chamber (110) is removable (Figure 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make Hoke and Watanabe top wall of the process chamber removable from the process chamber as taught by Raaijmakers.

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Motivation to make Hoke and Watanabe top wall of the process chamber removable from the process chamber as taught by Raaijmakers is for servicing and/or repairing the chamber components (column 1, lines 5-11).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) and Watanabe et al (USPat. 5,370,738) in view of Mikio Takagi (JP02-152251¹). Hoke and Watanabe are discussed above. Hoke and Watanabe do not teach that the bottom wall of the base unit is adapted to be stackedly attached to a second reactor assembly. Mikio Takagi teaches, per the translation, a vertical semiconductor manufacturing system (Page 2) including base units (2) adapted to be stackedly attached to plural reactor assemblies (Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce and vertically stack the Hoke and Watanabe reactor assembly as taught by Mikio Takagi.

Motivation to reproduce and vertically stack the Hoke and Watanabe reactor assembly as taught by Mikio Takagi is to minimize and effectively utilize expensive clean room space (page 7).

6. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) and Watanabe et al (USPat. 5,370,738), in view of Tepman et al (USPat. 5,228,501). Hoke and Watanabe are discussed above. Hoke and Watanabe do not teach that his chuck assembly comprises Applicant's means for regulating a substrate's temperature (specification [0039]). Tepman teaches a chuck assembly (Figure 1) including identical means for regulating a substrate's temperature (column 6, lines 34-51).

¹ Refer to STIC Translation

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the Hoke and Watanabe chuck assembly with Tepman's chuck assembly including identical means for regulating a substrate's temperature.

Motivation to replace the Hoke and Watanabe chuck assembly with Tepman's chuck assembly is to dissipate heat during processing (column 6, lines 45-51).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) and Watanabe et al (USPat. 5,370,738), in view of Gale et al (USPat. 4,839,145). Hoke and Watanabe are discussed above. Hoke and Watanabe do not teach a third opening in the sidewall for transporting the substrate into the interior region of the processing chamber. Gale teaches a similar cross-flow CVD reactor (Figure 20) including a third opening (904, first opening – 908, second opening - 910) in the sidewall for transporting the substrate (920) into the interior region of the processing chamber (not labeled; holding substrates 920).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a third opening to the Hoke and Watanabe sidewall for transporting the substrate into the interior region of the processing chamber as taught by Gale.

Motivation to add a third opening to the Hoke and Watanabe sidewall for transporting the substrate into the interior region of the processing chamber as taught by Gale is to provide added access to the processing chamber.

8. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) and Watanabe et al (USPat. 5,370,738), in view of Chazee (USPat. 5,190,592). Hoke and Watanabe are discussed above. Hoke and Watanabe do not teach that exhaust receiving portion is triangularly shaped. Chazee teaches a similar film deposition

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chamber over substrates (Figure 1; column 1, lines 5-17, 43-66) including an exhaust receiving portion (24; column 2, lines 9-12) that is triangularly shaped.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the Hoke and Watanabe exhaust receiving portion with Chazee's exhaust receiving portion that is triangularly shaped as taught by Chazee.

Motivation to replace the Hoke and Watanabe exhaust receiving portion with Chazee's exhaust receiving portion that is triangularly shaped as taught by Chazee is to "regulate the overflow and suction rate of the residual vapour phase" (column 2, lines 9-12).

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoke et al (USPat. 5,077,875) and Watanabe et al (USPat. 5,370,738), in view of Won et al (USPat. 6,355,108 B1). Hoke and Watanabe are discussed above. Hoke and Watanabe do not teach an exhaust flow restrictor made of anodized aluminum. Won teaches anodized aluminum parts (22) in a film deposition chamber (Figure 3; column 6, lines 8-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate the Hoke and Watanabe rectangular aperture from anodized aluminum as taught by Won.

Motivation to fabricate the Hoke and Watanabe rectangular aperture from anodized aluminum as taught by Won is to fabricate Hoke's rectangular aperture from an alternate and equivalent material.

Response to Arguments

10. Applicant's arguments filed April 7, 2003 have been fully considered but they are not persuasive.

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11. Applicant's argument that Hoke, Mikio, Tepman, Gale, Chazee, and Won each do not teach the newly added limitation of "a cylindrical opening extending through the bottom wall to the top wall to define a substantially cylindrically shaped interior region" is agreed by the Examiner. As a result, the anticipation rejection under Hoke is removed in place of an obvious type rejection in view of Watanabe et al (USPat. 5,370,738) as resulting from an updated search of the prior art.

12. Regarding Hoke's teaching away from a cylindrical reactor, Applicant's very citation of Hoke (column 7, lines 37-53) specifically states that a rectangular chamber would "potentially" result in "non-uniform deposition". However, Watanabe, as discussed above, demonstrates that a rectangular chamber produces laminar flow with uniform deposition as stated above (column 2, lines 14-18; Figure 4; column 5, lines 35-45).

13. Regarding Applicant's opinion that the reproduction and stacking of the Hoke and Mikio systems is not possible, the Examiner disagrees. In particular, to accommodate plural Hoke and Mikio reactors in a vertical arrangement there only needs to be accommodating dimensions/distances between the reproduced Hoke and Mikio reactors. Further, it has been held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), MPEP 2144.04). Additionally, it has been held that reproduction of components is obvious (In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA1960), MPEP 2144.04).

14. In response to Applicant's position that Gale cannot be combined with Hoke because "robotic transport of the substrate into the process chamber as taught by Hoke would be impeded by the RF coil". The Examiner disagrees. Gale's third opening (904, first opening – 908, second opening - 910) in the sidewall for transporting the substrate (920) into the interior region of the processing chamber (not labeled; holding substrates 920) can be positioned on Hoke's reactor at a location that is not impeded by Hoke's RF coil. Additionally, one of ordinary skill in the art would recognize that alternative coil wrapping can be used to allow access to the substrate from a third opening.

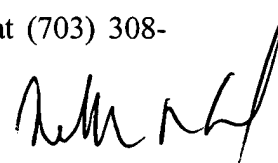
Conclusion

15. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-

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1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.



JEFFRIE R. LUND
PRIMARY EXAMINER